Independent Peer Review Report on the STAR Panel for Pacific mackerel (*Scomber japonicus*), held from 2-5 May 2011, in La Jolla, California.

John Casey

Prepared for

Center for Independent Experts (CIE)

The Centre for Fisheries and Aquaculture Science
Lowestoft Laboratory
Pakefield Road
Lowestoft
Suffolk NR33 0HT
England, United Kingdom
Phone +44 1502 524251
e-mail john.casey@cefas.co.uk
www.cefas.co.uk

CEFAS
The Centre for Environment, Fisheries & Aquaculture Science

Contents

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Executive Summary

Activities

The STAR Panel for Pacific Mackerel was held at the NMFS Southwest Fisheries Science Center (SWFSC), La Jolla, California from 08.30 am Monday 2 May 2011, through 1.00 pm Thursday 5 May 2011.

The 2011 draft assessment report on Pacific mackerel and supporting documentation were provided according to the scheduled timescale. All documentation was thoroughly reviewed ahead of the review meeting. The review meeting was conducted through a series of presentations by the stock assessment team (STAT) followed by questions from the Panel. The panel sought to identify potential improvements in model inputs and parameterisation and numerous requests to the STAT were addressed outside of the meeting and the responses subsequently presented to the Panel. Following the outcome of the additional requests, the model initially presented by the STAT in the draft assessment report was modified and the Panel agreed on an acceptable base model for the assessment.

Main findings

Consistent with the 2009 assessment for Pacific mackerel, the 2011 assessment was conducted using Stock Synthesis (SS). The candidate base case presented in the draft assessment report (model C1) was thoroughly reviewed and the Panel considered that while SS is an appropriate modelling framework for Pacific mackerel, the C1 configuration could most likely be improved upon. After numerous iterations of requests by the Panel and responses by the STAT, the Panel and STAT agreed on a base model that includes input data for two separate fisheries (commercial and recreational) and two survey indices (Commercial Passenger Fishing Vessel [CPFV] and California Recreational Fisheries Survey [CRFS]). The starting year for the model was set to 1983 in order to remove the impact of conflicting signals from the CPFV index and the recreational length frequency data. The year 1983 also coincides with the start of a period where growth appears to have stabilised.

The base model provides adequate fits to all of the data sources used for the assessment and the model outputs provide the best estimates for abundance and stock trends for Pacific mackerel currently available. The estimated 1+ biomass in 2011 from the base model is about 211,000 tonnes compared to a peak 1+ biomass of about 1,065,000 t estimated for 1983. However, the results from this assessment, including values for the Overfishing Level (OFL) and Harvest Guideline (HG), are rather sensitive to how the model is specified, and there is a strong retrospective bias with 1+ biomass consistently overestimated in the terminal year.

The sensitivity of model results to input specifications and the observed retrospective bias is likely to arise because of conflicting signals in the input data series, which may be largely attributable to data deficiencies in two main areas: i) incomplete sampling coverage of the catch, in particular that part of the catch taken by the Mexican fleet, and ii) the lack of a reliable and representative fishery-independent time-series index of stock abundance.

Recommendations

Recommendations in relation to the results of the 2011 assessment of the Pacific mackerel stock

The 2011 assessment results for Pacific mackerel, including values for the Overfishing Level (OFL) and Harvest Guideline (HG), are sensitive to model specifications and there is a strong retrospective bias. This means that the 1+ biomass is not precisely known. Despite the observed sensitivity to certain model specifications, I consider that the 1+ biomass estimate of 211,126 t for 2011 is relatively robust and can be used as a basis for the PFMC's harvest guideline for 2012. However, I **recommend** that the PFMC and its SSC take into account both the imprecision and the potential bias in the 2011 1+ biomass estimate when deciding on the catch limits for 2012.

Recommendations with regard to future stock assessments for Pacific mackerel

Since 2009, stock synthesis (SS) has been the preferred method for assessing the Pacific mackerel stock to form the basis for harvest guidelines for subsequent years. The 2011 assessment represents a huge improvement on the 2009 assessment in terms of robustness and model fit and I **recommend** that SS continue to be the model of choice to assess the Pacific mackerel stock.

The absence of a time series of fishery-independent estimates of stock abundance is a major weakness in the current Pacific mackerel stock assessment and a synoptic survey which is able to provide estimates of absolute abundance for Pacific mackerel is highly desirable. The acoustic –trawl survey index which has been developed has the potential to provide an appropriate estimate of absolute abundance once a suitable time series has been obtained, but the utility of such surveys would be significantly enhanced if the majority of the entire range of the stock (Mexico, USA and Canada) can be covered in an internationally co-ordinated survey. I therefore **recommend** that efforts be made to increase survey sampling and to extend the geographical range of the surveys to cover the entire range of the stock off the west coast of North America (Canada, US, and Mexico).

The above recommendations are in keeping with the recommendations in the STAR Panel Summary Report.

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1. BACKGROUND

In accordance with the Statement of work (SOW: Appendix 2), I was contracted to participate as a CIE independent review panellist for the 2011 STAR Panel for Pacific mackerel (*Scomber japonicus*). This is my independent report.

2. REVIEW ACTIVITIES

The 2011 STAR Panel for Pacific mackerel (*Scomber japonicus*) was held at the NMFS SWFSC, La Jolla, California from 2-5 May 2011. The Terms of Reference for STAR Panel are given in the SOW (Appendix 2: Annex 2).

Prior to the Review Workshop, I was provided with a draft stock assessment report for Pacific mackerel and relevant supporting documentation (Appendix 1). These were made available according to the agreed timescale via an ftp site. These documents were thoroughly reviewed ahead of the review meeting in order to gain a full understanding of the rationale for the approach, input data and assumptions used for the draft stock assessment.

Panel Members, members of the NMFS Pacific mackerel stock assessment team (STAT), representatives from the Pacific Fishery Management Council (PFMC) and other participants in the review are given in Appendix I. The meeting was open to the public, and was attended by several observers. For each stock, the results of the assessments were presented to the STAR Panel and other attendees, and the input data, assessment approach, results and utility of the findings for management were evaluated through open discussion. In the course of discussions, the Review Panel requested that additional analyses and evaluations be carried out by the STAT. These requests were documented and presented to the STAT who undertook the analyses requested and provided appropriate feedback to the Panel.

The main output from the review is contained in the Panel's consensus summary report, which is prepared in accordance with the prescribed format (Appendix 2: Annex 4). The Panel's report lists the requests to the STAT together with, the reason for the request and the response. In addition, technical merits and/or any deficiencies of the assessment, unresolved problems and major uncertainties and a list of research recommendations are also documented.

The Chair did an excellent job in maintaining focus on the pertinent points for discussion and in preparing the Panel's report. The STAT should be congratulated for their excellent preparation and presentation of their assessments and their willingness, drive and enthusiasm to respond to the numerous panel requests.

The report was completed in draft by the end of the review meeting and finalised and agreed by correspondence on 13 May.

Comments on the STAR process

In general I find the STAR process an extremely effective and thorough. I particularly like the practice of having written requests with the justification for the requests together with the responses from the STAT documented in the report. This is extremely helpful in keeping track of the issues raised by the Panel and rationale for developing the final assessment.

The success of the process depends heavily on the commitment, dedication and technical ability of the STAT. The demands placed on the members of the STAT under this process can be extreme. Not only are they present throughout the panel discussions, they must work outside of the meeting to respond to Panel requests and this usually involves working excessively long hours well into the night. I do not see any obvious way to deal with this other than for the STAT members to try to manage the workload more effectively and for the Panel members to minimise the number of additional requests.

3. FINDINGS

The draft stock assessment report and associated documentation prepared by the STAT was comprehensive, well presented and easily understood. As for the 2009 assessment of Pacific mackerel, the 2011 base model presented in the draft assessment report (model C1), was performed using Stock Synthesis (SS). Prior to 2009 assessments had been carried out using ASAP. SS is preferred over ASAP since it is more flexible and in principle, can account for variations in certain biological and fishery–related parameters that ASAP cannot.

The base model (C1) was evaluated with respect to a number of issues, particularly those relating to the following:

- The abundance indices to be used in the assessment model.
- The assumptions about selectivity and whether there is any *a priori* reason to assume any change in selectivity over time.
- The appropriate starting year for the assessment.

The evaluation was undertaken through requests to the STAT to perform alternative model runs and after numerous iterations of requests and responses, the Panel and STAT identified a base model configuration that performed adequately.

The key features of the final base model (Model XA) were as follows:

- Annual time-step starting in 1983
- M=0.5yr^{-1}; $\sigma_R = 1$

- Estimated growth curve (except for the CV of length-at-age for age 12)
- Two fisheries (recreational and commercial)
- Two surveys (CPFV and CRFS)
- Dome-shaped (double normal) selectivity patterns for the recreational fishery and the CRFS index (no time-blocking) and asymptotic selectivity for the commercial fishery (no time-blocking).
- Fitted to length-frequency data for the CPFV and non-CPFV fisheries, age-composition data from the commercial fishery, the CPFV and CRFS indices and length-at-age data from the commercial fishery.

The base model agreed on by the STAT and the Panel provides adequate fits to all of the available data sources and all of the selectivity and growth curves seem realistic. The model formulation agreed represents a significant change from the previous assessment conducted using SS. In particular, there are no time-blocks in selectivity or catchability and the starting year is 1983. I am confident that the agreed base model formulation and assumptions are consistent with *a priori* knowledge and that the 2011 assessment represents a significant improvement over previous assessments for Pacific mackerel.

However, there are a number of deficiencies in the assessment that are worthy of mention:

1) The assessment relies on two fishery-dependent indices, CRFS and CPFV. The CRFS index is new to the assessment and the time-series of data is short and hence is relatively uninformative. In addition, with regard to the CPFV time series, there are concerns as to how representative the index is of Pacific mackerel abundance because of the the CPFV data are derived from fishing activity that does not cover the entire range of the stock and may not be provide an unbiased estimate of the age /size composition of the population in the sea. Furthermore, the CPSAS advisor indicated that there may be inconsistent reporting of Pacific mackerel by charterboat skippers and other recreational fishers which also adds to the uncertainty related to the CPFV and CRFS indices. The assessment would undoubtedly benefit from a fishery-independent index of Pacific mackerel abundance and the acoustic-trawl methodology which was reviewed by a PFMC Methodology Panel in February 2011 is a potential candidate series. However, the data from these surveys are not currently ready for use in the stock assessment and the survey does not presently cover the majority of the distributional range of the stock.
2) A number of inconsistencies among some of the data sources included in the stock assessment were also noted. In particular, there appear to be inconsistent signals from the CPFV index and the recreational length-frequency data. To remove the impact of this inconsistency, the starting year was set to 1983 which resulted in an improved fit to the data sets.
3) There is evidence that the growth rate of fish spawned during the 1970s was faster than average. This characteristic has been noted in previous assessments and gives rise to residual patterns in the fits to the

commercial catch-at-age data. The Panel agreed to start the present assessment in 1983 which ensured that any influence of the increased growth rate of the fish spawned in the 1970s was largely removed. The conflicts in the data series remain however, and unless these can be resolved, the ability to reliably trace the history of the Pacific mackerel stock to the early 1960s will be compromised.

4) The estimates of peak biomass are very sensitive to what appear to be relatively small changes to the assumptions of the assessment especially the value of natural mortality (Table 1, Figure 1). The results of sensitivity runs indicated peak biomass estimates ranging from about 500,000t to implausibly high values approaching infinity.
5) The SS base model configuration agreed by the Panel performed adequately although the results from a retrospective analysis indicate a strong retrospective bias with a tendency to overestimate 1+ biomass in the most recent year of the assessment (Figure 2). For the range of years over which the retrospective analysis was run (2010- 2005), the terminal year overestimation was of the order of 10% - 20%. The reasons for the observed bias were not explicitly investigated during the STAR, although from a general perspective, such a bias is a frequent phenomenon in many stock assessments, and is invariably due to conflicting signals arising from the different data sources used.
6) The prospective analysis using the base run configuration seemed less problematic in terms of bias (Figure 3), although the 1+ biomass estimates for 2011 varied by up to about 30% depending on the starting year.
7) There is considerable uncertainty regarding how representative of the international fishery the input catch at length age are, because of an absence of age and length data from Mexican catches. At present, this deficiency is dealt with by assuming the same age and length compositions as the catches taken by the USA fleet.

Nevertheless, given the input data available, and despite the shortcomings indicated above, I am confident that the accepted base model provides the best representation of the historic trends in the stock back to 1883 and the best available estimate of 1+ biomass for 2011. Despite the observed sensitivity to certain model specifications, I consider that the 1+ biomass estimate of 211,126 t for 2011 is relatively robust.

4 Conclusions/Recommendations

Recommendations in relation to the results of the 2011 assessment of the Pacific mackerel stock

The 2011 assessment results for Pacific mackerel, including values for the Overfishing Level (OFL) and Harvest Guideline (HG), are sensitive to model specifications and there is a strong retrospective bias. This means that the 1+ biomass is not precisely known. Despite the observed sensitivity to certain

model specifications, I consider that the 1+ biomass estimate of 211,126 t for 2011 is relatively robust and can be used as a basis for the PFMC's harvest guideline for 2012. However, I **recommend** that the PFMC and its SSC take into account both the imprecision and the potential bias in the 2011 1+ biomass estimate when deciding on the catch limits for 2012.

Recommendations with regard to future stock assessments for Pacific mackerel

Since 2009, stock synthesis (SS) has been the preferred method for assessing the Pacific mackerel stock to form the basis for harvest guidelines for subsequent years. The 2011 assessment represents a huge improvement on the 2009 assessment in terms of robustness and model fit and I **recommend** that SS continue to be the model of choice to assess the Pacific mackerel stock.

The absence of a time series of fishery-independent estimates of stock abundance is a major weakness in the current Pacific mackerel stock assessment and a synoptic survey which is able to provide estimates of absolute abundance for Pacific mackerel is highly desirable. The acoustic –trawl survey index which has been developed has the potential to provide an appropriate estimate of absolute abundance once a suitable time series has been obtained, but the utility of such surveys would be significantly enhanced if the majority of the entire range of the stock (Mexico, USA and Canada) can be covered in an internationally co-ordinated survey. I therefore **recommend** that efforts be made to increase survey sampling and to extend the geographical range of the surveys to cover the entire range of the stock off the west coast of North America (Canada, US, and Mexico).

The above recommendations are in keeping with the recommendations in the STAR Panel Summary Report.

Specific research recommendations for Pacific mackerel

The Panel made a number of research recommendations to be undertaken before the next stock assessment for Pacific mackerel. These are given below.

A) Biological (e.g., length, age, sex) data on mackerel caught in the Pacific Northwest should be collected if a directed fishery develops in this region.

B) Improve collaboration with fishery researchers from Mexico and Canada. A large fraction of the catch is taken off Mexico. In particular, catches of Pacific mackerel have been as large as those off California in recent years. Efforts should continue to be made to obtain length, age, and related biological data from the Mexican fisheries for inclusion in stock assessments. Furthermore, collaboration with Mexico will be necessary for the development of a synoptic acoustic-trawl survey, which is especially pertinent given the need for a fishery independent survey for this stock (see recommendation D).

C) Reconsider the suite of indices and make recommendations for future assessments. Especially important is the need to develop a fishery independent survey. For example, continue work on the acoustic (and CalCOFI) survey and develop new indices as available (as was done for CRFS in this assessment).

D) Review and analyse the raw data on which the CPFV index is based and consider area blocks (i.e., spatial blocks within areas) as a factor in generalized linear models (GLMs).

E) Look at correlation of Pacific mackerel catch in CPFV with other CPS to explore the possibility of changes in targeting practices within the CPFV fleet among years. Perhaps apply the MacCall and Stephens (2004) subsetting approach.

F) Determine if CRFS training or protocol should be revisited so that samplers are more certain to inquire of bait fish caught. This recommendation stems from the observation that some fishermen may not currently report those mackerel caught and used for bait, and it is unknown if this amount is significant.

G) Increase support of current port sampling and laboratory analysis programs for CPS. In particular, there is a need to reanalyse biological parameters including sex ratio, sex-specific parameters, and natural mortality rates (M), including the possibility of larger M on 0- and 1-year old Pacific mackerel.

H) Ageing error should be revisited. Few otoliths have currently been read multiple times, so additional readings need to be made. An age validation study should be conducted for Pacific mackerel. Such a study should compare age readings based on whole and sectioned otoliths and consider a marginal increment analysis and other validation methods. The method of Punt et al. (2009) for estimating ageing error should also likely be considered.

I) Conduct a study to update the information used to determine maturity-at-length (and maturity-at-age).

J) Revisit the basis for the current estimate of M and explore the use of historical tagging data to estimate M.

K) Indices of abundance based on the CPFV fishing mode of CRFS sampling and the CPFV logbook records were inconsistent. Paired trips sampled by CRFS and CPFV should be explored in an attempt to resolve this discrepancy.

L) Compare catch rate trends of CPFV observer data and CPFV logbook data for the years 1985-89. This work may help validate trends in the logbook data.

M) Standard data processing procedures should be developed for CPS, similar to those developed for groundfish species, and a ‘data document’ should

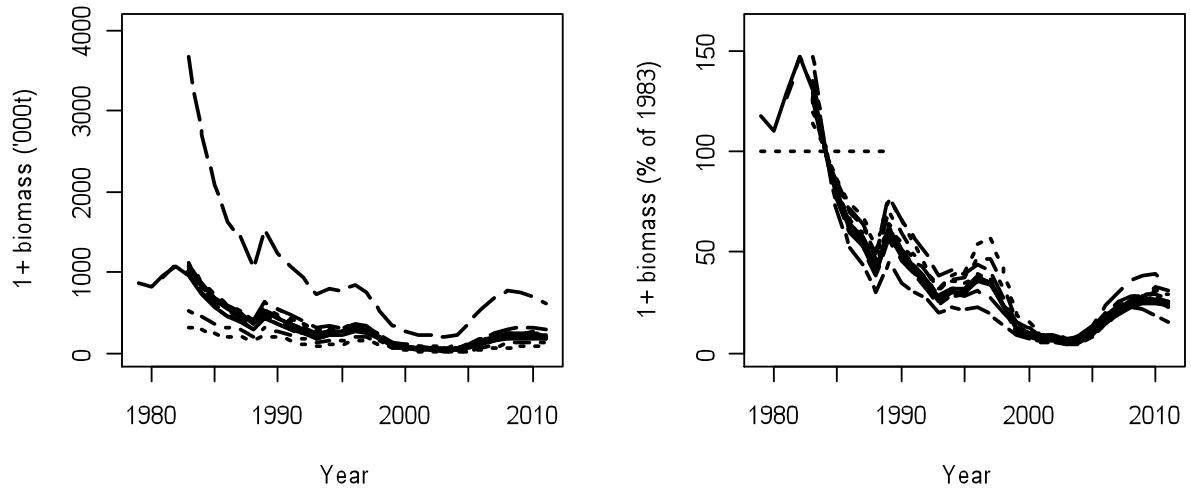
be developed which provides, in considerable detail, how the basic data sources (e.g., catches, CPFV indices, etc.) are constructed. Much of this information has been published in the past, but a single (and 'living') document describing the basic data will assist assessment authors and future review panels.

Table 1. Results of sensitivity tests for the final base model (Base=Model XA).

Scenario No	Description	B_{1+} (2011)	B_{1+} (peak)	-LnL (total)	-LnL (CPFV)	-LnL (CRFS)
0	Base	211,126	1,065,990	842.5	-6.4	-5.3
1	2x λ (CPFV index)	219,896	1,123,910	830.4	-16.3	-6.2
2	2x λ (CRFS index)	200,383	1,073,720	836.4	-7.6	-6.6
3[&]	2x λ (Rec length data)	287,442	1,025,710	1,029.7	-5.8	-3.9
4	2x λ (Com age data)	178,682	981,870	1,188.6	10.8	-1.5
5	2x λ (Length-at-age data)	210,748	1,103,060	864.1	-5.9	-5.6
6	Omit all CRFS data	251,550	1,047,730	785.2	-0.5	na
7	M = 0.3 yr^{-1}	95,667	323,656	853.9	4.4	-4.8
8[&]	M = 0.4 yr^{-1}	130,587	444,452	860.2	-1.8	-3.4
9	M = 0.6 yr^{-1}	606,752	3,676,670	840.3	-8.6	-5.9
10	M = 0.7 yr^{-1}	**	**	839.3	-6.7	-5.9
11	Start in 1978	171,415	1,080,300	1,231.6	-1.1	-5.2
12	Start in 1981	190,897	1,096,960	1,007.1	-4.3	-5.0
13	Start in 1990	217,789	556,043	455.0	-9.9	-4.9
14	Estimate CV(a_{max})	226,929	1,082,290	851.5	-8.4	-4.3
15	σ_R = 0.8	210,172	1,053,200	841.4	-6.9	-5.4
16	σ_R = 1.2	211,258	1,071,720	845.0	-6.2	-5.3

** Biomass is essentially infinite and Hessian may not be positive definite

Figure 1. Time-trajectories of 1+ biomass from the sensitivity tests given in Table 1 (absolute [left panel] and relative [right panel]). The results for scenario 10 are omitted from the left panel, given estimates are essentially infinite and hence implausible.



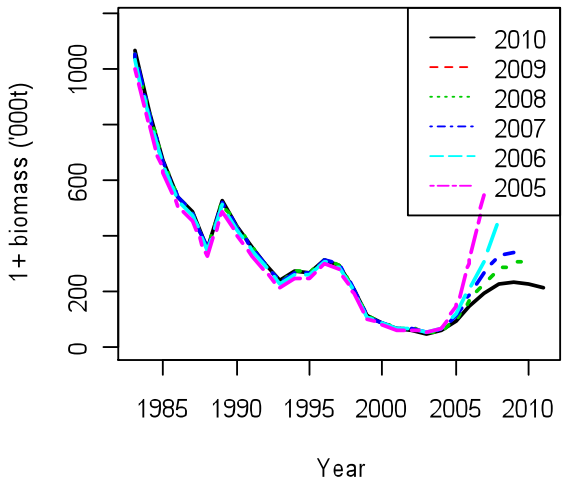


Figure 2. Results of the retrospective analysis for the final base model (Model XA).

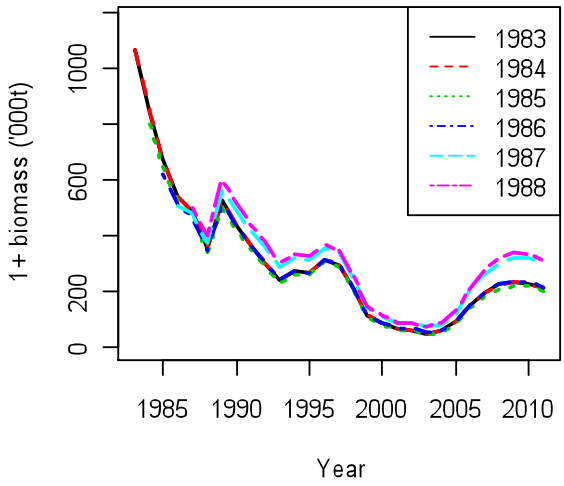


Figure 3. Results of the prospective analysis for the final base model (Model XA).

Appendix 1. Bibliography of materials provided for the 2011 STAR Panel for Pacific mackerel.

1. P. R. Crone, K. T. Hill, J.D. McDaniel, and N. C. H. Lo (2009). Pacific mackerel (*Scomber japonicus*) Stock Assessment for USA Management in the 2009-10 Fishing Year. Assessment report submitted to PFMC Agenda Item H.1.b Attachment 1, June 2009.

2. P. R. Crone, K. T. Hill, J.D. McDaniel, and K. Lynn (2011). Pacific mackerel (*Scomber japonicus*) Stock Assessment for USA Management in the 2009-10 Fishing Year. DRAFT Assessment report submitted to STAR.

3. Nancy C. H. Lo, Emmanis Dorval, René Funes-Rodríguez, Martín E. Hernández-Rivas, Yuhong Huang and Zhengyu Fan (2010). Utilities of larval densities of Pacific mackerel (*Scomber japonicus*) off California, USA and west coast of Mexico from 1951 to 2008, as spawning biomass indices. Ciencia Pesquera Vol. 18(2), 59-75.

4. Gary D. Melvin (2009). Independent Peer Review Report on the STAR Panel Review for Pacific sardine and Pacific mackerel, 04-08 May 2009, La Jolla, California.

5. Methot, Richard D. 2005. Technical Description of the Stock Synthesis II Assessment Program Version 1.17 – March 2005.

6. Methot, Richard D. 2005. User Manual for Stock Synthesis 2 (SS2). Model Version 3.2. NOAA Fisheries Service, Washington, Updated January 21, 2011.

7. STAR (2009). DRAFT STAR Panel report on Pacific mackerel held in La Jolla, California, 4-8 May 2009.

8. Edward D. Weber and Sam McClatchie (2011). Effect of Environmental Conditions on the distribution of Pacific Mackerel *Scomber japonicus* Larvae in the California Current. DRAFT NOAA Technical Report, NOAA Southwest Fisheries Science Center 8604 La Jolla Shores Drive La Jolla, California 92107.

9. Ian Taylor, Ian Stewart, Allan Hicks, Tommy Garrison, Andre Punt, John Wallace, Chantel Wetzel, and other contributors (2011). Package 'r4ss': R code for Stock Synthesis. February 18 2011. 81pp.

10. Pacific Fishery Management Council (2010). Terms of Reference for a Coastal Pelagic Species Stock Assessment Review Process. Pacific Fishery Management Council pursuant to National Oceanic and Atmospheric Administration Award Number NA10NMF4410014. 23 pp.

11. Pacific Fishery Management Council (2009). Proposed Procedures for Estimating Pacific Halibut Bycatch in the Groundfish Setline Fisheries. Council Decisions – June 13-18, 2009 Meetings. 11pp.

12. Pacific Fishery Management Council (2009). Scientific and Statistical Committee Report on Pacific mackerel Management for 2009-2010. Agenda Item H.1.c. Supplemental SSC Report, June 2009.

Appendix 2: Statement of Work for Dr. John Casey (CEFAS)

External Independent Peer Review by the Center for Independent Experts

STAR Panel Review of Pacific Mackerel Stock Assessment

May 2-5, 2011

Scope of Work and CIE Process: The National Marine Fisheries Service's (NMFS) Office of Science and Technology coordinates and manages a contract providing external expertise through the Center for Independent Experts (CIE) to conduct independent peer reviews of NMFS scientific projects. The Statement of Work (SoW) described herein was established by the NMFS Project Contact and Contracting Officer's Technical Representative (COTR), and reviewed by CIE for compliance with their policy for providing independent expertise that can provide impartial and independent peer review without conflicts of interest. CIE reviewers are selected by the CIE Steering Committee and CIE Coordination Team to conduct the independent peer review of NMFS science in compliance the predetermined Terms of Reference (ToRs) of the peer review. Each CIE reviewer is contracted to deliver an independent peer review report to be approved by the CIE Steering Committee and the report is to be formatted with content requirements as specified in **Annex 1**. This SoW describes the work tasks and deliverables of the CIE reviewer for conducting an independent peer review of the following NMFS project. Further information on the CIE process can be obtained from www.ciereviews.org.

Project Description: The CIE reviewer will serve on a Stock Assessment Review (STAR) Panel and will be expected to participate in the review of Pacific mackerel stock assessment. The Pacific mackerel stock is assessed regularly (currently, every 1-2 years) by SWFSC scientists, and the Pacific Fishery Management Council (PFMC) uses the resulting biomass estimate to establish an annual harvest guideline (quota). The stock assessment data and model are formally reviewed by a Stock Assessment Review (STAR) Panel once every three years, with a coastal pelagic species subcommittee of the SSC reviewing updates in interim years. Independent peer review is required by the PFMC review process. The STAR Panel will review draft stock assessment documents and any other pertinent information for Pacific mackerel, work with the stock assessment teams to make necessary revisions, and produce a STAR Panel report for use by the PFMC and other interested persons for developing management recommendations for the fishery. The PFMC's Terms of Reference (ToRs) for the STAR Panel review are attached in **Annex 2**. The tentative agenda of the Panel review meeting is attached in **Annex 3**. Finally, a Panel summary report template is attached as **Annex 4**.

Requirements for CIE Reviewer: The CIE reviewer shall conduct an impartial and independent peer review in accordance with the SoW and ToRs herein. The required CIE expertise is requested in the following descending order of importance:

- The CIE shall have expertise in the application of fish stock assessment methods, particularly, length/age-structured modeling approaches, e.g., 'forward-simulation' models (such as Stock Synthesis, SS) and it is desirable to have familiarity in 'backward-simulation' models (such as Virtual Population Analysis, VPA).
- The CIE reviewer shall have expertise in the life history strategies and population dynamics of coastal pelagic fishes. It is desirable to be familiar with the design and execution of fishery-independent surveys for coastal pelagic fishes.

The CIE reviewer's duties shall not exceed a maximum of 14 days to complete all work tasks of the peer review process.

Location/Date of Peer Review: The CIE reviewer shall conduct an independent peer review during the STAR Panel review meeting at NOAA Fisheries, Southwest Fisheries Science Center, 8604 La Jolla Shores, La Jolla, California from May 2-5, 2011 in accordance with the schedule of milestones and deliverables herein.

Statement of Tasks: The CIE reviewer shall complete the following tasks in accordance with the SoW and Schedule of Milestones and Deliverables herein.

Prior to the Peer Review: Upon completion of the CIE reviewer selection by the CIE Steering committee, the CIE shall provide the CIE reviewer information (name, affiliation, and contact details) to the COTR, who forwards this information to the NMFS Project Contact no later the date specified in the Schedule of Milestones and Deliverables. The CIE is responsible for providing the SoW and ToRs to the CIE reviewer. The NMFS Project Contact is responsible for providing the CIE reviewer with the background documents, reports, foreign national security clearance, and information concerning other pertinent meeting arrangements. The NMFS Project Contact is also responsible for providing the Chair a copy of the SoW in advance of the panel review meeting. Any changes to the SoW or ToRs must be made through the COTR prior to the commencement of the peer review.

Foreign National Security Clearance: When CIE reviewer participates during a panel review meeting at a government facility, the NMFS Project Contact is responsible for obtaining the Foreign National Security Clearance approval for CIE reviewer who are non-US citizens. For this reason, the CIE reviewer shall provide requested information (e.g., name, contact information, birth date, passport number, travel dates, and country of origin) to the NMFS Project Clearance for the purpose of their security clearance, and this information shall be submitted at least 30 days before the peer review in accordance with the NOAA Deemed Export Technology Control Program NAO 207-12 regulations (available at the Deemed Exports NAO website: http://deemedexports.noaa.gov/sponsor.html).

Pre-review Background Documents: Two weeks before the peer review, the NMFS Project Contact will send by electronic mail or make available at an FTP site to the CIE reviewer all necessary background information and reports for

the peer review. In the case where the documents need to be mailed, the NMFS Project Contact will consult with the CIE on where to send documents. The CIE reviewer shall read all documents in preparation for the peer review, for example:

- Recent stock assessment documents since 2009;
- STAR Panel- and SSC-related documents pertaining to reviews of past assessments;
- CIE-related summary reports pertaining to past assessments; and
- Miscellaneous documents, such as ToR, logistical considerations.

Pre-review documents will be provided up to two weeks before the peer review. Any delays in submission of pre-review documents for the CIE peer review will result in delays with the CIE peer review process, including a SoW modification to the schedule of milestones and deliverables. Furthermore, the CIE reviewer is responsible only for the pre-review documents that are delivered to the reviewer in accordance to the SoW scheduled deadlines specified herein.

Panel Review Meeting: The CIE reviewer shall conduct the independent peer review in accordance with the SoW and ToRs. **Modifications to the SoW and ToR cannot be made during the peer review, and any SoW or ToR modification prior to the peer review shall be approved by the COTR and CIE Lead Coordinator.** The CIE reviewer shall actively participate in a professional and respectful manner as a member of the meeting review panel, and their peer review tasks shall be focused on the ToRs as specified in the contract SoW.

Respective roles of the CIE reviewer and STAR Panel chair are described in Annex 2 (see p. 6-8). The CIE reviewer will serve a role that is equivalent to the other panelists, differing only in the fact that he/she is considered an 'external' member (i.e., outside the Pacific Fishery Management Council family and not involved in management or assessment of West Coast CPS). The CIE reviewer will serve at the behest of the STAR Panel Chair, adhering to all aspects of the PFMC's ToR as described in Annex 2. The STAR Panel chair is responsible for: 1) developing an agenda, 2) ensuring that STAR Panel members (including the CIE reviewer), and STAT Teams follow the Terms of Reference, 3) participating in the review of the assessment (along with the CIE reviewer), 4) guiding the STAR Panel (including the CIE reviewer) and STAT Team to mutually agreeable solutions.

The NMFS Project Contact is responsible for any facility arrangements (e.g., conference room for panel review meetings or teleconference arrangements). The CIE Lead Coordinator can contact the Project Contact to confirm any peer review arrangements, including the meeting facility arrangements.

Contract Deliverables - Independent CIE Peer Review Reports: The CIE reviewer shall complete an independent peer review report in accordance with the SoW. The CIE reviewer shall complete the independent peer review according to required format and content as described in Annex 1. The CIE

reviewer shall complete the independent peer review addressing each ToR as described in Annex 2.

Other Tasks – Contribution to Summary Report: The CIE reviewer will assist the Chair of the panel review meeting with contributions to the Summary Report. CIE reviewer is not required to reach a consensus, and should instead provide a brief summary of their views on the summary of findings and conclusions reached by the review panel in accordance with the ToRs.

Specific Tasks for CIE Reviewer: The following chronological list of tasks shall be completed by the CIE reviewer in a timely manner as specified in the **Schedule of Milestones and Deliverables**.

1) Conduct necessary pre-review preparations, including the review of background material and reports provided by the NMFS Project Contact in advance of the peer review;
2) Participate during the panel review meeting in La Jolla, California during May 2-5, 2011 as called for in the SoW, and conduct an independent peer review in accordance with the ToRs (Annex 2);
3) No later than May 23, 2011, the CIE reviewer shall submit an independent peer review report addressed to the "Center for Independent Experts," and sent to Mr. Manoj Shivlani, CIE Lead Coordinator, via email to shivlanim@bellsouth.net, and CIE Regional Coordinator, via email to Dr. David Die ddie@rsmas.miami.edu. The CIE report shall be written using the format and content requirements specified in Annex 1, and address each ToR in Annex 2;
4) CIE reviewer shall address changes as required by the CIE review in accordance with the schedule of milestones and deliverables.

Schedule of Milestones and Deliverables: CIE shall complete the tasks and deliverables described in this SoW in accordance with the following schedule.

March 29, 2011	CIE sends reviewer contact information to the COTR, who then sends this to the NMFS Project Contact
April 18, 2011	NMFS Project Contact sends the CIE Reviewer the pre-review documents
May 2-5, 2011	The reviewer participates and conducts an independent peer review during the Panel review meeting
May 23, 2011	CIE reviewer submits draft CIE independent peer review reports to the CIE Lead Coordinator and CIE Regional Coordinator
June 3, 2011	CIE submits CIE independent peer review reports to the COTR
June 10, 2011	The COTR distributes the final CIE reports to the NMFS Project Contact and regional Center Director

Modifications to the Statement of Work: Requests to modify this SoW must be made through the Contracting Officer's Technical Representative (COTR) who submits the modification for approval to the Contracting Officer at least 15 working days prior to making any permanent substitutions. The Contracting Officer will notify the CIE within 10 working days after receipt of all required information of the decision on substitutions. The COTR can approve changes to the milestone dates, list of pre-review documents, and Terms of Reference (ToR) of the SoW as long as the role and ability of the CIE reviewer to complete the SoW deliverable in accordance with the ToRs and deliverable schedule are not adversely impacted. The SoW and ToRs cannot be changed once the peer review has begun.

Acceptance of Deliverables: Upon review and acceptance of the CIE independent peer review reports by the CIE Lead Coordinator, Regional Coordinator, and Steering Committee, these reports shall be sent to the COTR for final approval as contract deliverables based on compliance with the SoW. As specified in the Schedule of Milestones and Deliverables, the CIE shall send via e-mail the contract deliverables (the CIE independent peer review reports) to the COTR (William Michaels, via William.Michaels@noaa.gov).

Applicable Performance Standards: The contract is successfully completed when the COTR provides final approval of the contract deliverables. The acceptance of the contract deliverables shall be based on three performance standards: (1) the CIE report shall have the format and content in accordance with Annex 1, (2) the CIE report shall address each ToR as specified in Annex 2, (3) the CIE reports shall be delivered in a timely manner as specified in the schedule of milestones and deliverables.

Distribution of Approved Deliverables: Upon notification of acceptance by the COTR, the CIE Lead Coordinator shall send via e-mail the final CIE reports in *.PDF format to the COTR. The COTR will distribute the approved CIE reports to the NMFS Project Contact and regional Center Director.

Support Personnel:

William Michaels, Program Manager, COTR
NMFS Office of Science and Technology
1315 East West Hwy, SSMC3, F/ST4, Silver Spring, MD 20910
William.Michaels@noaa.gov Phone: 301-713-2363 ext 136

Manoj Shivlani, CIE Lead Coordinator
Northern Taiga Ventures, Inc.
10600 SW 131st Court, Miami, FL 33186
shivlanim@bellsouth.net Phone: 305-383-4229

Roger W. Peretti, Executive Vice President
Northern Taiga Ventures, Inc. (NTVI)
22375 Broderick Drive, Suite 215, Sterling, VA 20166
RPerretti@ntvifederal.com Phone: 571-223-7717

Key Personnel:

Nancy Lo, **NMFS Project Contact**
Fisheries Resources Division, Southwest Fisheries Science Center,
8604 La Jolla Shores Dr., La Jolla, CA 92037
Lo.Nancy@noaa.gov Phone: 858-546-7123

Dr. Russ Vetter, Director, FRD,
Fisheries Resources Division, Southwest Fisheries Science Center,
8604 La Jolla Shores Dr., La Jolla, CA 92037
Russ.Vetter@noaa.gov Phone: 858-546-7125

Annex 1: Format and Contents of CIE Independent Peer Review Report

1. The CIE independent report shall be prefaced with an Executive Summary providing a concise summary of the findings and recommendations.

2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR, and Conclusions and Recommendations in accordance with the ToRs.

   a. Reviewer should describe in their own words the review activities completed during the panel review meeting, including providing a detailed summary of findings, conclusions, and recommendations.

   b. Reviewer should discuss their independent views on each ToR even if these were consistent with those of other panelists, and especially where there were divergent views.

   c. Reviewer should elaborate on any points raised in the Summary Report that they feel might require further clarification.

   d. Reviewer shall provide a critique of the NMFS review process, including suggestions for improvements of both process and products.

   e. The CIE independent report shall be a stand-alone document for others to understand the proceedings and findings of the meeting, regardless of whether or not they read the summary report. The CIE independent report shall be an independent peer review of each ToRs, and shall not simply repeat the contents of the summary report.

3. The reviewer report shall include as separate appendices as follows:

   Appendix 1: Bibliography of materials provided for review
   Appendix 2: A copy of the CIE Statement of Work
   Appendix 3: Panel Membership or other pertinent information from the panel review meeting.

Annex 2: Terms of Reference for the Peer Review of the Pacific mackerel stock assessment

The CIE reviewer is one of the four equal members of the STAR panel. The principal responsibilities of the STAR Panel are to review stock assessment data inputs, analytical models, and to provide complete STAR Panel reports.

Along with the entire STAR Panel, the CIE Reviewer's duties include:
1. reviewing draft stock assessment and other pertinent information (e.g.; previous assessments and STAR Panel reports);
2. working with STAT Teams to ensure assessments are reviewed as needed;
3. documenting meeting discussions;
4. reviewing summaries of stock status (prepared by STAT Teams) for inclusion in the Stock Assessment and Fishery Evaluation (SAFE) document;
5. recommending alternative methods and/or modifications of proposed methods, as appropriate during the STAR Panel meeting, and;
6. The STAR Panel's terms of reference concern technical aspects of stock assessment work. The STAR Panel should strive for a risk neutral approach in its reports and deliberations.

The STAR Panel, including the CIE Reviewer, is responsible for determining if a stock assessment or technical analysis is sufficiently complete. It is their responsibility to identify assessments that cannot be reviewed or completed for any reason. The decision that an assessment is complete should be made by Panel consensus. If agreement cannot be reached, then the nature of the disagreement must be described in the Panels' and CIE Reviewer's reports.

The review solely concerns technical aspects of stock assessment. It is therefore important that the Panel strive for a risk neutral perspective in its reports and deliberations. Assessment results based on model scenarios that have a flawed technical basis, or are questionable on other grounds, should be identified by the Panel and excluded from the set upon which management advice is to be developed. The STAR Panel should comment on the degree to which the accepted model scenarios describe and quantify the major sources of uncertainty Confidence intervals of indices and model outputs, as well as other measures of uncertainty that could affect management decisions, should be provided in completed stock assessments and the reports prepared by STAR Panels.

Recommendations and requests to the STAT Team for additional or revised analyses must be clear, explicit, and in writing. A written summary of discussion on significant technical points and lists of all STAR Panel recommendations and requests to the STAT Team are required in the STAR Panel's report. This should be completed (at least in draft form) prior to the end of the meeting. It is the chair and Panel's responsibility to carry out any follow-up review of work that is required.

Annex 3: Agenda

STAR Panel Review of Pacific Mackerel Stock Assessment
National Marine Fisheries Service
Southwest Fisheries Science Center
Green Room, 8604 La Jolla Shores Drive
La Jolla, CA 92037
858-334-2800

Monday 2 May

08h30	Call to Order and Administrative Matters	
	Introductions	Punt
	Facilities, e-mail, network, etc.	Lo
	Work plan and Terms of Reference	Griffin
	Report Outline and Appointment of Rapporteurs	Punt
09h00	Pacific Mackerel assessment presentation	Crone
10h00	Break	
10h30	Pacific Mackerel assessment presentation	Crone
11h30	Discussion and STAR Panel requests	Panel
12h30	Lunch	
13h30	Panel discussion and analysis requests	Panel
14h30	Spatial distributions of Pacific mackerel larvae	Weber
15h00	Break	
15h30	Acoustic and trawl survey	Zwolinski
16h00	Public comments	
17h00	Adjourn	

Tuesday and Wednesday 3-4 May

08h00.	Assessment Team Responses	Crone
10h30	Break	
11h00.	Discussion and STAR Panel requests	Panel
12h30	Lunch	
13h30	Report drafting	Panel
15h00	Break	
15h30	Assessment Team Responses	Crone
16h30	Discussion and STAR Panel requests	
17h00	Adjourn	

Thursday, 5 May

08h00	Assessment Team Responses	Crone
09h00	Finalize STAR Panel Report	Panel
10h30	Break	
11h00	Finalize STAR Panel Report	Panel
13h00	Adjourn	

Annex 4: STAR Panel Summary Report (Template)

- Names and affiliations of STAR Panel members

- List of analyses requested by the STAR Panel, the rationale for each request, and a brief summary the STAT responses to each request

- Comments on the technical merits and/or deficiencies in the assessment and recommendations for remedies

- Explanation of areas of disagreement regarding STAR Panel recommendations
  - Among STAR Panel members (including concerns raised by the CPSMT and CPSAS representatives)
  - Between the STAR Panel and STAT Team

- Unresolved problems and major uncertainties, e.g., any special issues that complicate scientific assessment, questions about the best model scenario, etc.

- Management, data or fishery issues raised by the public and CPSMT and CPSAS representatives during the STAR Panel

- Prioritized recommendations for future research and data collection

Appendix 3: Participants in the 2011 STAR Panel for Pacific mackerel held from 2-5 May 2011, SWFSC, La Jolla, California, USA.

STAR Panel:

André Punt, Chair, SSC, Univ. of Washington
John Casey, CIE, Cefas
Jonathan Deroba, NMFS, Northeast Fisheries Science Center

Pacific Fishery Management Council (Council) Representatives:

Briana Brady, CPSMT, CDFG
David Haworth, CPSAS
Kerry Griffin, Council Staff

Pacific Mackerel Stock Assessment Team:

Paul Crone, NMFS, SWFSC
Kevin Hill, NMFS, SWFSC
Jenny McDaniel, NMFS, SWFSC
Kirk Lynn, CDFG

Others in Attendance

Alexandre Aires-da-Silva, Inter-American Tropical Tuna Commission (IATTC)
John Butler, SWFSC
Ray Conser, SWFSC, SSC
Suzie Kohin, SWFSC
Emmanis Dorval, SWFSC
Sam Herrick, SWFSC, CPSMT
Nancy Lo, SWFSC
Mark Maunder, IATTC
Bev Macewicz, SWFSC
Charles Pereti, UCSD
Dale Sweetnam, CDFG, CPSMT
Steve Teo, SWFSC
Russ Vetter, SWFSC
Ed Weber, SWFSC